CLAIMS

1. A fuel-cell stack comprising at least two elementary cells (2) (3), disposed in facing relationship, for an exothermic combustion reaction constituting a heat source, and an internal duct (11) formed between the cells for circulation of a cooling fluid (12) constituting a cold sink, characterized in that it comprises a plurality of thermoelectric modules (13), each comprising a pair of elements of two conductive materials (14) (15) of dissimilar nature, a first end of each pair being in thermal contact with the heat source or the cold sink, the second end of each of the elements of the said pair being in contact with the other source or sink, and being electrically connected to a neighboring module.

2. A fuel-cell stack according to claim 1, characterized in that the thermoelectric module is composed of a pair of conductive materials connected at one of their ends to a conductive connection (16) in thermal contact with a plate (5) of the heat source (2, 3), and connected to one another at their free ends by a conductive connection (17) in thermal contact with the cold sink (12).

3. A fuel-cell stack according to claim 1 or 2, characterized in that the two conductive materials (14) (15) of the thermoelectric modules (13) are semiconductor materials, one of P type and the other of N type.

4. A fuel-cell stack according to any one of claims 1 to 3, characterized in that the N-type materials (13) are alloys of silicon and germanium doped with phosphorus and the P-type materials (14) are alloys of silicon and germanium doped with boron.

5. A fuel-cell stack according to any one of claims 1 to 4, characterized in that the conductive connections (16) (17) connecting the ends of the materials are

composed of molybdenum electrodes.

6. A fuel-cell stack according to any one of claims 1 to 5, characterized in that the last thermoelectric module of an assembly disposed along a first elementary cell (2) is electrically connected in series or in parallel with the first thermoelectric module of an assembly disposed along a second elementary cell (3).

7. A fuel-cell stack according to any one of claims 1 to 6, characterized in that a plate (18) forming a wall equipped with fins (19) is disposed on the external surface of the assembly of thermoelectric modules on the same side as the internal cooling duct (11).

8. A method for partial recuperation of thermal energy originating from a fuel-cell stack, in the interior of which there circulates, between two elementary cells of the fuel-cell stack constituting the heat source, a cooling fluid (12) constituting the cold sink, characterized in that the cooling fluid (12) is placed in thermal contact with a plurality of thermoelectric modules (13) and the electrical energy generated by Seebeck effect is recuperated.

9. A method according to claim 8, characterized in that cooling of the cell stack is two-phase.